Amendments to the Specification

Nine paragraphs at page 3, line 12 to page 4, line 13:

~~FIG. 3 a & b is a diagram~~ FIGS. 3A and 3B are diagrams gradationally showing results of examining by simulation radiative recombination emission rates in the light-emitting diode shown in FIG. 1 in a range of 0 to 1 x 10^{20} /s-cm^3, wherein diagrams a and b are shown among four diagrams a to d corresponding to hole mobility, and the diagrams a to d show a section of the light-emitting diode in which a horizontal axis indicates a width of the element along a direction parallel with a substrate surface, and the width of the element is 10 nm in each case, while a vertical axis indicates a thickness of the element along a direction vertical to a substrate;

~~FIG. 4 c & d shows~~ FIGS. 3C and 3D show diagrams c and d among the four diagrams a to d in the same manner as ~~FIG. 3~~ FIGS. 3A and 3B;

FIG. [[5]] 4 is a diagram showing results of examining by simulation a voltage/current characteristic of the light-emitting diode shown in FIG. 1, wherein a horizontal axis indicates a voltage (V) applied to an anode, and a vertical axis indicates an anode current (nA, nanoamps);

FIG. [[6]] 5 is a block diagram of a time of flight measurement device used in Example 1;

FIG. [[7]] 6 shows a voltage/current curve of the light-emitting diode manufactured in Example 2;

FIG. [[8]] 7 shows an emission spectrum of the light-emitting diode manufactured in Example 2, wherein (a) indicates the emission spectrum of the light-emitting diode of the present invention, and (b) indicates the emission spectrum of a p-n junction type light-emitting diode manufactured as a comparative example;

FIG. [[9]] 8 is a sectional view showing a structure of a light-emitting diode which is

one embodiment according to the present invention;

FIG. [[10]] 9 is a sectional view showing a structure of a light-emitting diode in Example 3; and

FIG. [[11]] 10 is a sectional view showing a structure of a light-emitting diode in Example 6.

Paragraph at page 5, lines 20-24:

Furthermore, an embodiment of the light-emitting element of the present invention also includes a lateral light-emitting diode as in FIG. [[9]] 8. An ambipolar inorganic semiconductor 105 which is a light-emitting layer is formed on a substrate 101, and an n-electrode 103 and a p-electrode 107 are formed on the light-emitting layer 105 in a form contacting the light-emitting layer 105 but not contacting each other.

Two Paragraphs at page 9, line 24 to page 10, line 15:

Section models of the light-emitting diode used for the calculation are shown in FIGS. ~~3 and 4~~ 3A – 3D. The substrate material is GaAs. It has a structure in which 100nm of n-type ZnSe is deposited as the n-electrode, and 500nm of ZnSe is stack deposited the light-emitting layer, and moreover, 100nm of type p-ZnSe is deposited in the stack as the p-electrode. A metal electrode which makes an ohmic connection with the n-electrode is affixed to the interface between the substrate and the n-electrode, and a metal electrode which makes an ohmic connection with the p-electrode is affixed to a surface of the p-electrode. Densities of n-dopant and a p-dopant in both the electrodes is 1×10^{18} /cm^3, and it is assumed that one dopant produces one carrier. In every layer, the mobility of the electrons is fixed to 20 cm^2/Vs. The mobility of the holes is 20 cm^2/Vs in FIG. [[3a]] 3A, 5 cm^2/Vs in FIG. [[3b]] 3B, 1 cm^2/Vs in FIG. [[4c]] 3C, and 0.1 cm^2/Vs in FIG. [[4d]] 3D.

FIGS. ~~3 and 4~~ 3A – 3D illustrate results of calculating a recombination emission rate shown gradationally in brightness in a range of 0 to 1 x 10^{20} /scm^3. Thus, it is possible to view the light-emitting portion in the section of the light-emitting diode, wherein the recombination emission rate is higher in whiter areas. It is apparent that, as the mobility of the holes decreases when compared with the mobility of the electrons, the light-emitting portion is displaced from a central position between the electrodes, and moves to the p-electrode side.

Paragraph at page 10, line 24 to page 11, line 13:

In the above calculation, part of results of examining a relation between the mobility and the current is shown in FIG. [[5]] 4. A horizontal axis indicates a voltage (V) applied to an anode, and a vertical axis indicates an anode current (nA, nanoamp). However, a width in an x-axis direction of the diode is 10 nm, and a width in a z-axis direction (direction to an inner side of the drawing) is 1 μm. Therefore, current density per cm^2 can be obtained by increasing a value in the graph 10^{11} times. Alphabetic symbols indicated in the graph correspond to a set of mobilities of both the carriers illustrated in FIGS. ~~3 and 4~~ 3A – 3D. That is, in all cases in the graph, the electron mobility is 20 cm^2/Vs. In a case of (a), the hole mobility is 20 cm^2/Vs, and the current density when 5 V is applied is 450 A/cm^2. As the mobility of the holes decreases, the current value is reduced. This corresponds to the fact that the emission intensity is reduced as the mobility of the holes decreases in FIGS. ~~3 and 4~~ 3A – 3D. In a case of [[d]] FIG. 3D, the hole mobility is 0.1 cm^2/Vs, and the current density when 5 V is applied is 2.4 A/cm^2. Further, when both the electron mobility the hole mobility are set at 0.1 cm^2/Vs, the obtained current value is lower. It is possible to judge from this that light emission with practical intensity cannot be expected when the mobility of the carriers is 0.1 cm^2/Vs or less.

Paragraph at page 30, lines 9-20:

FIG. [[7]] 6 shows a voltage/current curve when a voltage is applied across an n-GaAs substrate and an Au electrode of the light-emitting diode. A satisfactory nonlinear curve was obtained. A rising voltage was in the vicinity of 3 V, and this corresponds to a forbidden bandwidth of ZnSe which is an ambipolar inorganic semiconductor material. Further, FIG. [[8]] 7 shows emission spectra obtained when a voltage of 5V is applied. Curve (a) represents an emission spectrum according to the light-emitting diode of the present example, and a spectrum having a narrow half-value width was obtained at a wavelength of 460 nm. A wavelength of 460 nm is 2.7 eV when converted into light energy, which coincides with the forbidden bandwidth of ZnSe which is the ambipolar inorganic semiconductor material. A light-emitting portion is considered to be between p-electrode/light-emitting layer interface and a light-emitting layer/n-electrode interface.

Paragraph at page 31, lines 10-7:

In addition, in the present example, a p-n junction type light-emitting diode can be manufactured by not forming the ZnSe light-emitting layer. Curve (b) in FIG. [[8]] 7 represents an emission spectrum according to the p-n junction type light-emitting diode thus manufactured. Light is emitted which has a large half-value width and a wavelength of about 600 nm. This is considered to be light emission derived from an N dopant existing in p-ZnSe or light emission derived from an Al dopant existing in n-ZnSe.

Paragraph at page 32, line 20 to page 33, line 5:

In Example 2, a stacking order was changed in the following manner. Example 3 will be described with reference to FIG. [[10]] 9. A p-ZnSe film 136 doped with N was formed at 2 μm on a non-doped p-GaAs (100) substrate 131. Next, part of the p-ZnSe substrate 136 was

covered with a mask, and a ZnSe layer 135 was stacked at 200 nm on the remainder, thereby producing a light-emitting layer. Moreover, after an Mg film 132 was deposited on the light-emitting layer 135, the Mg film 132 was covered with an Au film 134, and an n-electrode 133 was thus produced as an Mg/Au laminated film. Next, the mask covering a surface of p-ZnSe was removed, and a Pd film 138 was vapor-deposited on the surface, and then an Au film 139 was further deposited thereon, thereby creating a p-ZnSe/Pd/Au structure as a p-electrode 137. When a voltage of 10 V was applied across the electrodes, an emission spectrum similar to that of curve (a) in FIG. [[8]] 7 was obtained.

Paragraph at page 35, line 16 to page 36, line 1:

A p-diamond contact layer was formed as part of a p-electrode on the substrate. An undoped diamond layer which was a light-emitting layer was stacked on the p-diamond contact layer. Further, a n-diamond contact layer was formed as part of an n-electrode. Moreover, a metal electrode was formed in contact with both the contact layers. Here, in order to bring the p-contact layer into contact with the metal electrode, there is provided a structure in which part of a surface of the p-contact layer was masked so as to expose the p-contact layer when the light-emitting layer and the n-contact layer are stacked. That is, a light-emitting diode of the present example has a structure shown in FIG. [[11]] 10, which has, on a substrate 161, a p-electrode (167) composed of a p-diamond contact layer 166 and a metal 168, an undoped diamond layer 165 as the light-emitting layer, and a p-electrode (163) composed of an n-diamond contact layer 162 and a metal 164.

Paragraph at page 38, lines 9-23:

The present example corresponds to a structure of a light-emitting diode shown in FIG.

[[9]] 8. A non-doped ZnSe film was deposited at 1 μm on a glass substrate (manufactured by Corning Corporation, #7059) of 20 mm square by an MBE device as in Example 7. On this film, a Cl-doped ZnSe film having a size of 1 mm × 0.5 mm was stacked at 300 nm using a metal mask. Subsequently, a $CuFeSe_2$ film having a size of 1 mm × 0.5 mm was stacked at a thickness of 300 μm on the non-doped ZnSe film with a distance of 0.3 mm from the Cl-doped ZnSe film so as to form a shape of a Roman figure II. Further, an Au film was stacked at 300 nm on the formed Cl-doped ZnSe film and $CuFeSe_2$ film, thereby manufacturing a diode. That is, an n-ZnSe/Au as an n-electrode and $CuFeSe_2$/Au as a p-electrode were formed.